Math 10C Chapter 5 Review notes

5.1 Representing Relations

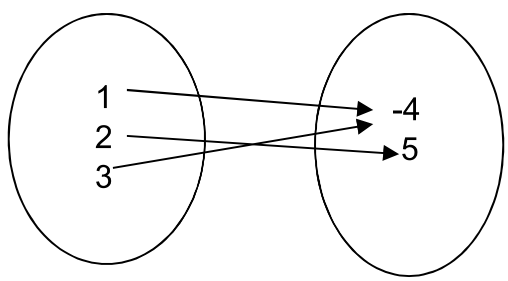
Relation: associates elements in one set with elements in another set. I.e. How two things are related.

Set: a collection of objects

Element: one object in a set

There are 5 ways to represent relations:

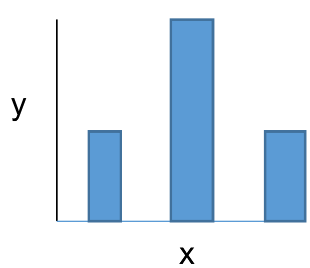
1. Words: you describe the relation in words by basically “regurgitating” the statement given in the question
2. Ordered pairs: (1, 2), (2, 5), (-3, 6)
3. Arrow Diagram: the numbers have to be in ascending order or the words have to be in alphabetical order and no repeats are allowed.



4. Table of values: the x values must be in ascending order. Repeats are allowed.

x	y
-1	0
-1	-1
2	3
3	2

5. Bar Graph: x goes on the horizontal axis, y goes on the vertical axis



5.2 Functions

For something to be a function, for every x, there is only one y. In other words, all the x values are different.

Example: (1, 2), (3, 3),(4, 3)

Answer: this is a function because all the x values are different. Notice it doesn't matter if the y values are repeated.

You can also use the vertical line test: a graph is a function if when vertical lines are drawn, they only go through one point on the graph.

Domain: all the x values or all the first elements
Range: all the y values or all the second elements

Function notation: it involves using brackets rather than the y variable.

An equation would be represented by $y = 2x + 3$ and function notation would be:

$$f(x) = 2x + 3$$

f(x) is just a fancy way of saying "y".

We can use function notation to simplify writing. For example, let's say we want to find y when the x value is 2. We can simply write:

$f(x) = 2x + 3$. Find $f(2)$.

When you're given the x value, just simply plug it in.

$$f(2) = 2(2) + 3 = 7$$

You can always go backwards. For example, let's say we want to find x when $f(x) = 7$.
You simply plug in 7 for the f(x).

$$7 = 2x + 3$$
$$4 = 2x$$
$$2 = x$$

To recap, function notation has brackets Ex. $C(n) = 50n + 200$. Equations in two variables don't have brackets….they just have the two variables. Ex. $C = 50n + 200$.

Note: When there is an x in the question, you don't simply remove the brackets to make the equation in two variables.

For example: $f(x) = 2x + 3$, isn't written as $f = 2x + 3$. It is written as $y = 2x + 3$.

5.3 Interpreting and Sketching Graphs

You need to be able to do three types of questions:

1. Read graphs and answer questions
2. Read a graph and make up a story
3. Draw a graph based on information given

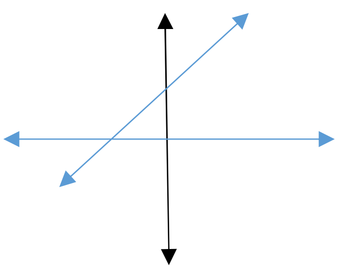
Independent Variable: x (horizontal axis)
Dependent Variable: y (vertical axis)

Remember when you are drawing a graph, if there are only positive values, you make an L shaped graph. If you have positives and negatives, you need the full coordinate plane.

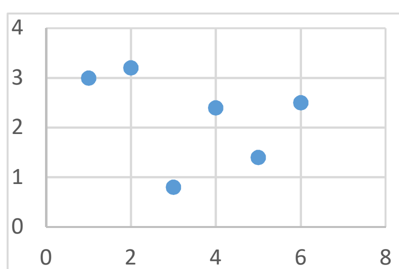
5.4 Connect the dots

How do you know if you should connect the dots on a graph? If there is data in between (in other words, decimals are allowed), then you connect the dots.

Continuous: connected dots



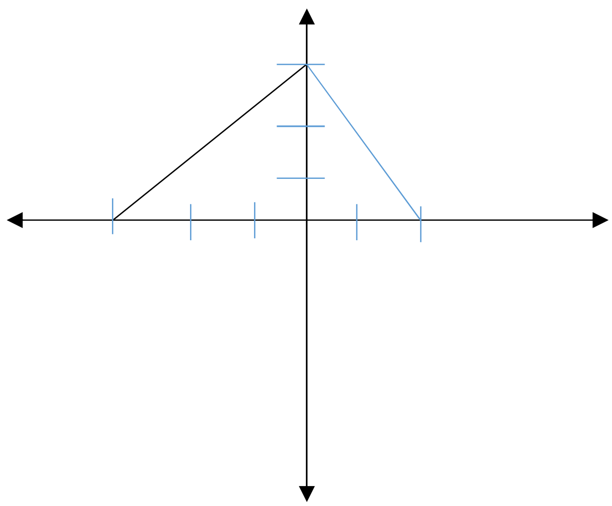
Discrete: unconnected dots



5.5 Graphs

Domain and range can be more complicated.

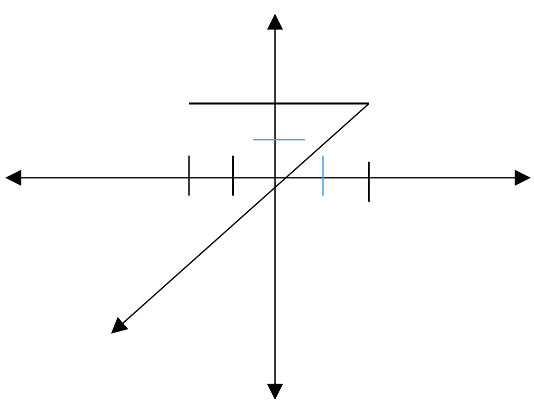
“Two boundary” questions: (assume that each “tic” is 1 unit)



Notice that on the x-axis, the x-values start at -3 and end at 2. On the y-axis, the y-values start at 0 and end at 3. AND, as long as you list the smaller value first, you can use less than signs.

Domain: {$-3 \le x \le 2$}
Range: {$0 \le y \le 3$}

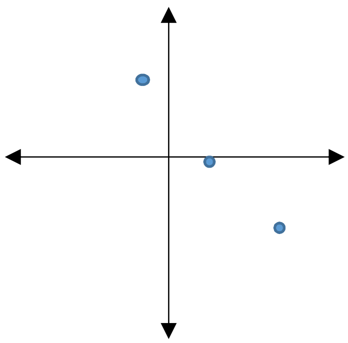
“One boundary” questions: these have an arrow on one end of the graph.



Domain: the x-values ends at 2, but goes to negative infinity. Since the graph occurs to the left of 2, it would be less than. {$x \le 2$}
Range: the y-values end at 2, but goes to negative inifinity. Since the graph occurs below 2, it would be less than. {$y \le 2$}

"Points" questions:

If the graph is just a collection of points, then you need to list the points separately.



Domain: {-1, 1, 3}
Range: {-3, 0, 3}

5.6 Properties of Linear Relations

Linear relation: will look like a straight line on a graph. Also, both x and y go up by even increments.

We can find the rate of change (how one unit changes):

$$rate\ of\ change = \frac{change\ in\ y}{change\ in\ x} = \frac{\Delta y}{\Delta x}$$

If the line goes up and to the right, it is a positive rate of change. If the line goes down and to the right, it is a negative rate of change.

Example:

Given the following table of values, what is the rate of change?

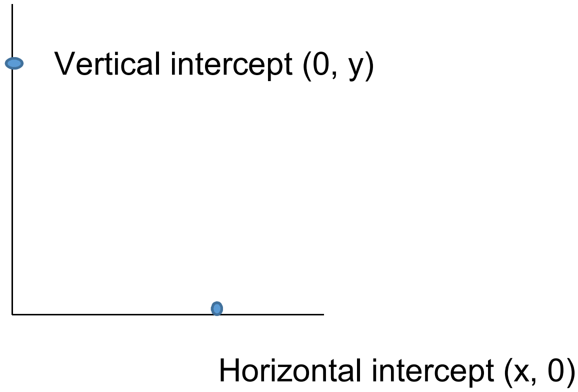
Time (min)	Cost ($)
0	50
10	75
20	100

Notice that the y-values go up by $25 and the x-values go up by 10 minutes. So the rate of change is:

$$rate\ of\ change = \frac{change\ in\ y}{change\ in\ x} = \frac{\$25}{10\ min} = \$2.50/min$$

Make sure you put units on the rate of change always reduce.

5.7 Interpreting graphs of Linear Relations



To find an equation for a linear function, we can use: $C = nt + b$

C is the y value, n is the rate of change, t is the x-value and b is the fixed rate.

So, if we make an equation for the example from 5.6, it would be:

> $C = 2.50t + 50$, because 2.50 is the rate of change and 50 is the starting amount (fixed rate)